CS300 Color Display and Keypad Controls
Datascope is now MAQUET Cardiovascular

In early 2009, the purchase agreement between Datascope and Getinge AB was completed. As a result, Datascope's innovative cardiovascular product portfolio will be integrated into MAQUET Cardiovascular, a global leader representing the Medical Systems Business area of Getinge AB.

Cardiac professionals have always relied on gold-standard Cardiac Assist products from Datascope, helping them to feel confident that they are delivering the highest quality of care to their patients. Now, as a part of MAQUET Cardiovascular, Datascope is even better positioned to focus on the future advancement of Cardiac Assist products and seeks to explore the full potential of this technology through our continued dedication to innovation, service and clinical excellence.

Quality Products:
Expect the same great quality products you have relied on over the years with names you are familiar with like: Fidelity, Linear and Sensation IAB’s, CS300 balloon pumps, SafeGuard and StatLock.

Quality Service:
Rest assured that you will receive the same amazing service and clinical support you have become accustomed to from Datascope. We are still here for you 24/7 with technical support, loaner equipment and clinical help.

Worldwide:
MAQUET ranks among the leading providers of medical products, therapies and services for Surgical Workplaces, Critical Care and Cardiovascular applications. Since its foundation more than 170 years ago, MAQUET has stood for innovation and the advancement of patient care technologies in the field of medicine. The portfolio of MAQUET products is extensive, providing a comprehensive solution that is designed for efficient workflows, safety and the improvement of patient lives and outcomes.

Welcome to MAQUET Cardiovascular:
With a fresh vision of the future, this new, combined organization is committed to providing the highest quality patient care solutions for cardiologists, interventional radiologists, cardiothoracic and vascular surgeons, critical care clinicians and their teams.

For further information please visit www.datascope.com
Managing Intra-Aortic Balloon Therapy

Course Description
This six hour program is designed for the experienced healthcare professional directly involved with the care of the patient requiring intra-aortic balloon pump therapy. Participants should have experience with hemodynamic monitoring and 6 months critical care experience. Previous experience with intra-aortic balloon pump therapy is preferred.

This program is comprised of 3 modules consisting of theoretical, technical, and clinical considerations for a patient requiring IABP therapy. The theoretical module will briefly review cardiac physiology and the theory of intra-aortic balloon pumping. The technical module will discuss percutaneous insertion and removal of the intra aortic-balloon catheter followed by a detailed explanation of the Datascope IABP, highlighting troubleshooting in the clinical setting. Case studies will be utilized to further reinforce troubleshooting techniques. The clinical module provides a discussion of clinical considerations for patients requiring IABP therapy. A skills workshop utilizing the system trainer and Abbreviated Operator’s Guide will be provided.

Behavioral Objectives
At the conclusion of this program, the participants will be able to:
1) Define the two physiologic effects achieved by the mechanics of inflation and deflation of the IAB as it relates to the cardiac cycle illustrated by an augmented arterial pressure waveform.
2) Identify four indications and three contraindications for IABP therapy.
3) Identify the potential complications associated with IABP therapy.
4) Demonstrate the set up, operation, and troubleshooting of the Datascope IABP utilizing the system trainer for practice and the abbreviated operators guide for reference.

Caution: U.S. Federal Law restricts this device to sale by or on the order of a physician. Refer to package insert for current indications, warnings, contraindications, precautions and instructions for use.
# Course Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8:00 – 8:10</td>
<td>Introduction</td>
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<tr>
<td></td>
<td>Review Program</td>
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<tr>
<td>8:10 – 9:30</td>
<td>MODULE I - Theoretical Aspects</td>
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<tr>
<td></td>
<td>Review Cardiac Mechanics</td>
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<td></td>
<td>Measurement of Cardiac Performance</td>
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<td></td>
<td>Left Ventricular Failure</td>
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<tr>
<td></td>
<td>Theory of IABP</td>
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<tr>
<td></td>
<td>Factors Affecting Diastolic Augmentation/Timing Errors</td>
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<tr>
<td></td>
<td>Indications/Contraindications</td>
</tr>
<tr>
<td>9:30 – 9:45</td>
<td>Break</td>
</tr>
<tr>
<td>9:45 – 10:45</td>
<td>MODULE II IAB - Catheter and Technical Introduction to IABP</td>
</tr>
<tr>
<td></td>
<td>IAB Catheter Insertion</td>
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<td></td>
<td>Technical Features of the IABP</td>
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<tr>
<td>10:45 – 11:00</td>
<td>Break</td>
</tr>
<tr>
<td>11:00 – 12:00</td>
<td>Troubleshooting Alarm and Advisory Messages</td>
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<tr>
<td></td>
<td>Hands On</td>
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<tr>
<td>12:00 – 12:30</td>
<td>Lunch</td>
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<tr>
<td>12:30 – 1:15</td>
<td>Additional Hands on</td>
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<tr>
<td>1:15 – 1:45</td>
<td>MODULE III - Clinical Considerations</td>
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<tr>
<td></td>
<td>Side Effects/Potential Complications</td>
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<tr>
<td></td>
<td>Care Management/Case Studies</td>
</tr>
<tr>
<td>1:45 – 2:00</td>
<td>Open Discussion</td>
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<td></td>
<td>Program Evaluation</td>
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</tbody>
</table>
Module I

Theoretical Aspects of IABP
I. Review Physiology of Cardiac Mechanics

A. Cardiac Cycle
   1. Atrial Systole
   2. Isovolumetric Contraction
   3. Ventricular Ejection
      a. Slow Ejection
      b. Rapid Ejection
      c. Slow Ejection
   4. Isovolumetric Relaxation
   5. Ventricular Filling
      a. Rapid Filling
      b. Slow Filling
B. Pressure Waves

1. Ventricular Waveform
   a. Pressure
   b. Volume

2. Arterial
   a. Radial/Brachial
   b. Aortic
Normal Arterial Waveform

- **Systolic Pressure**
- **Run-off Phase** (25% SV ejected)
- **Rapid Ventricular Ejection Phase** (75% SV ejected)
- **Aortic Valve Opens**
-**Dicrotic Notch**
  - Aortic valve closes
  - Diastole begins
- **Aortic End Diastolic Pressure**
C. Myocardial Oxygen Supply and Demand

<table>
<thead>
<tr>
<th>SUPPLY</th>
<th>DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coronary artery anatomy</td>
<td>1. Heart Rate</td>
</tr>
<tr>
<td>2. Diastolic pressure</td>
<td>2. Afterload</td>
</tr>
<tr>
<td>3. Diastolic time</td>
<td>3. Preload</td>
</tr>
<tr>
<td>4. O₂ extraction</td>
<td>4. Contractility</td>
</tr>
<tr>
<td>a. HBG</td>
<td></td>
</tr>
<tr>
<td>b. PaO₂</td>
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</tbody>
</table>

D. Frank-Starling Law of Heart

Ventricular function curve. As the end-diastolic volume increases, so does the force of ventricular contraction. Thus the stroke volume becomes greater up to a critical point after which stroke volume decreases. [Cardiac failure]
LV Failure

Pumping Efficiency
|LV Volume & Pressure|
|Receptors Activate|
|HR|

Vasoconstriction
|Release of Catecholamines|
|Airflow (QVFD)|
|O₂ Demand|
|Peak (QVHDF)|

Supply

C.O.
|Glomerular Filtration Pressure|
|Activation of Renin-Angiotensin-Aldosterone-ADH|
|Na⁺ & H₂O Retention|
|Peak (QVHDF)| Airflow (QVFD)|

Demand

Supply

Hypervolemia

O₂ Demand|
|C.O.|
|HR|
|O₂ Supply|
|Pulmonary Artery Pressure|

Pulmonary Edema
|Oxygenation|
|Contractility|

Tissue Hypoxia

Peak
|Anaerobic Metabolism|
|Lactic Acid Production|
|Tissue Acidosis|

Tissue Anoxia

DEATH
II. Theory of IABP Therapy

A. Counterpulsation

1. Balloon Structure and Position
2. Increased Coronary Perfusion
   a. Inflation
   b. Augmentation of Diastolic Pressure
3. Decreased Left Ventricular Workload
   a. Deflation
   b. Afterload Reduction
4. Physiological Pressure Wave Changes
   a. Dicrotic Notch
   b. Diastole: Augmentation
   c. Decreased End-Diastolic Pressure
   d. Systole: Decreased Assisted Systolic Pressure
A. One Complete Cardiac Cycle
B. Unassisted Aortic End Diastolic Pressure
C. Unassisted Systolic Pressure
D. Diastolic Augmentation
E. Assisted Aortic End Diastolic Pressure
F. Reduced Systolic Pressure

Increased Coronary Artery Perfusion

Reduced Myocardial O₂ Demand
ARTERIAL WAVEFORM VARIATIONS DURING IABP THERAPY

1:1 IABP Frequency

1:2 IABP Frequency

1:3 IABP Frequency
B. Effects of IABP

1. Primary
   a. Supply
   b. Demand

2. Secondary
   a. CO/CI
   b. HR
   c. PAD-PCWP
   d. SVR
   e. B/P-SYSTOLIC
      DIASTOLIC
      MAP
      DIASTOLIC AUGMENTATION

3. Systemic
   a. Neuro
   b. Renal
   c. Vascular
   d. Respiratory

C. Factors Affecting Diastolic Augmentation

1. Patient Hemodynamics
   a. Heart Rate
   b. Stroke Volume
   c. Mean Arterial Pressure
   d. System Vascular Resistance

2. Intra-Aortic Balloon
   a. IAB in Sheath
   b. IAB Not Unfolded
   c. IAB Position
   d. Kink in IAB Catheter
   e. IAB Leak
   f. Low Helium Concentration

3. IABP
   a. Timing
   b. Position of IAB Augmentation Control
D. **Timing Errors**

1. **Early Inflation**
   Inflation of the IAB prior to aortic valve closure

   **Waveform Characteristics:**
   - Inflation of IAB prior to dicrotic notch
   - Diastolic augmentation encroaches onto systole (may be unable to distinguish)

   **Physiologic Effects:**
   - Potential premature closure of aortic valve
   - Potential increase in LVEDV and LVEDP or PCWP
   - Increased left ventricular wall stress or afterload
   - Aortic Regurgitation
   - Increased MVO₂ demand

2. **Late Inflation**
   Inflation of the IAB markedly after closure of the aortic valve

   **Waveform Characteristics:**
   - Inflation of the IAB after the dicrotic notch
   - Absence of sharp V
   - Sub-optimal diastolic augmentation

   **Physiologic Effects:**
   - Sub-optimal coronary artery perfusion
3. Early Deflation

Premature deflation of the IAB during the diastolic phase

**Waveform Characteristics**
- Deflation of IAB is seen as a sharp drop following diastolic augmentation
- Sub-optimal diastolic augmentation
- Assisted aortic end diastolic pressure may be equal to or less than the unassisted aortic end diastolic pressure
- Assisted systolic pressure may rise

**Physiologic Effects:**
- Sub-optimal coronary perfusion
- Potential for retrograde coronary and carotid blood flow
- Angina may occur as a result of retrograde coronary blood flow
- Sub-optimal afterload reduction
- Increased MVO$_2$ demand

4. Late Deflation

**Waveform Characteristics:**
- Assisted aortic end-diastolic pressure may be equal to the unassisted aortic end diastolic pressure
- Rate of rise of assisted systole is prolonged
- Diastolic augmentation may appear widened

**Physiologic Effects:**
- Afterload reduction is essentially absent
- Increased MVO$_2$ consumption due to the left ventricle ejecting against a greater resistance and a prolonged isovolumetric contraction phase
- IAB may impede left ventricular ejection and increase the afterload
E.  **Indications**

1. Refractory Unstable Angina
2. Impending Infarction
3. Acute MI
4. Refractory Ventricular Failure
5. Complications of Acute MI [i.e. acute MR or VSD, or papillary muscle rupture]
6. Cardiogenic Shock
7. Support for diagnostic, percutaneous revascularization, and interventional procedures
8. Ischemia related intractable ventricular arrhythmias
9. Septic Shock
10. Intraoperative pulsatile flow generation
11. Weaning from bypass
12. Cardiac support for non-cardiac surgery
13. Prophylactic support in preparation for cardiac surgery
14. Post surgical myocardial dysfunction/low cardiac output syndrome
15. Myocardial contusion
16. Mechanical bridge to other assist devices
17. Cardiac support following correction of anatomical defects

F.  **Contraindications**

1. Severe aortic insufficiency
2. Abdominal or aortic aneurysm
3. Severe calcific aorta-iliac disease or peripheral vascular disease
4. Sheathless insertion with severe obesity, scarring of the groin, or other contraindications to percutaneous insertion

**Please Refer to the Instructions for Use Prior to Insertion of the IAB**
Module II

Technical Aspects
I. Intra-Aortic Balloon Catheter

A. Designed for sheathless or sheathed insertion

Fiberoptic IAB catheter

Conventional IAB Catheter
B. Clinical Considerations for Central Aortic Pressure Monitoring

**PRECAUTION:** For optimal signal quality, use no more than 8 feet (2.5 meters) maximum of pressure tubing between the transducer and female luer hub of the Y-fitting.

The Instructions For Use (IFU) booklet included in the intra-aortic balloon catheter package should be carefully reviewed.

**For Conventional IAB Catheters:**

**NOTE:** All fittings should be luer lock.

When monitoring pressure through the inner lumen of a conventional IAB catheter, use a standard arterial pressure monitoring apparatus connected to a three-way stopcock. Connect the three-way stopcock to the female luer hub of the inner lumen. Per hospital policy, a fast forward flush may be performed hourly to help maintain patency of the inner lumen.

1. All personnel responsible for the maintenance of the central aortic pressure line and inner lumen of the IAB catheter should read and follow these warnings.

**WARNINGS:** Careful and cautious technique should be used to prevent thrombus or air from embolizing off the tip of the catheter. Such an embolus could potentially enter the carotid or coronary arteries from the aortic arch.

*Do not pulsate the intra-aortic balloon when manipulating the central aortic pressure line or inner lumen with a syringe.*

Following initial insertion, do not manually flush the central aortic pressure line or inner lumen with a syringe.

2. The following clinical considerations should be adhered to during the setup and operation of the central aortic pressure line and inner lumen of the IAB catheter.

**A.** Follow standard protocols for arterial pressure monitoring. The heparin dosage should be in accordance with standard hospital practice for arterial pressure lines and may be modified on physician discretion for patients receiving anticoagulation.

**B.** A 3cc per hour continuous flush device should be incorporated into the arterial pressure monitoring apparatus. Fast forward flushing once every hour using the 3cc per hour flush device is recommended.

**C.** Always aspirate 3cc initially if the central aortic pressure line or inner lumen becomes damped. Whenever the inner lumen of the IAB becomes filled with blood (such as after aspiration), the flush valve should be activated for a minimum of 15 seconds in addition to the time it takes to clear the pressure tubing of blood. Should resistance be met upon aspiration, consider the lumen to be occluded. Discontinue use of the central aortic pressure line and inner lumen by placing a sterile male luer lock cap on the port.

**D.** Troubleshooting of the central aortic pressure line should be conducted with the same considerations as a standard arterial line. ¹

**E.** The inner lumen of the IAB catheter should not be used for blood sampling.

**F.** Do not use a R.O.S.E. (Resonance Over Shoot Eliminator) or other damping device.


**For Datascope fiber-optic IAB catheters:**

1. Once the catheter is in place, aspirate and discard 3cc of blood from the inner lumen and then immediately perform a manual flush using a syringe filled with 3cc to 5cc of flush solution. This will minimize the chances of stagnant blood clotting the inner lumen.

2. Using current hospital protocol, connect a standard arterial pressure flush apparatus to the hub of the inner lumen. A continuous 3cc/hour flush is recommended.
II. Technical Components of the CS300 Intra-Aortic Balloon Pump
A.  **Rear Panel**

1.  **Fiberoptic Module**
   a.  IAB Sensor Input
   b.  Vent Key
   c.  To bedside monitor

2.  **Safety Disk/Condensate Removal System**
   a.  DC Input
   b.  IAB Fill Port
   c.  Drain Port

3.  **Helium Supply**
   a.  Pressure Gauge
   b.  Manual Fill Port

4.  **Patient Connections**
   a.  ECG
   b.  Pressure
   c.  Monitor Input
      - ECG
      - Pressure
   d.  ECG/Pressure Output

5.  **Data Communications Outputs**
   a.  RS-232
   b.  Phone Line
   c.  Diagnostic Output

6.  **Power Cord/Mains**

7.  **System Timer**
B. Monitor CS300

1. Alarm and Advisory Messages
2. ECG
   a. Lead
   b. Gain
3. Pressure Source
4. IAB Fill Mode
5. Slow Gas Alarm Status
6. Operation Mode
7. IAB Status Indicator
8. Trigger
9. Heart Rate Display
10. Pressure Display
11. Augmentation Alarm
12. Battery Indicator
13. Helium Indicator
C. CS300 IABP Key Pad Controls

1. Operation Mode Keys
   a. AUTO
   b. Semi-Auto
   c. Manual
2. Zero Pressure Key
3. START key and Indicator
4. STANDBY Key and Indicator
5. Trigger Source Key
   a. ECG
   b. Pressure
   c. Pacer V/AV
   d. Pacer A
   e. Internal
6. IAB Frequency
7. IAB Augmentation
8. IAB Inflation Controls
9. IAB Deflation Controls
D. CS300 Key Pad Control Panel

1. Alarm Mute Key
2. IAB Fill Key
3. Help Key Indicator
4. Menu Guide
   a. Ref Line
   b. Aug, Alarm
   c. ECG/AP Sources
   d. Pump Options
   e. User Preferences
5. Inflation Interval Key
6. Freeze Display Key
7. Print Strip Key
E. Recorder

1. ECG

2. Pressure

3. Balloon Pressure Waveform
F. System Battery
   1. Charge Status
   2. Portable Operation

G. Doppler Storage
The inflation marker shows the period of inflation. Vertical timing marks located below the arterial waveform are also available to aid with initial timing. The timing markers indicate the point at which the inflate and deflate commands are sent.

A unique automatic timing algorithm allows effective balloon pumping even during atrial fibrillation. Press the Inflation Interval key to observe the period of inflation while pumping. Vertical markers located below the arterial waveform and the highlighted portion indicate the period of balloon inflation.
III. Troubleshooting

A. High Priority Alarms:

All Modes:
- Augmentation Below Limit Set*
- No Trigger
- IAB Disconnected
- Check IAB Catheter
- Leak in IAB Circuit
- Rapid Gas Loss
- Blood Detected
- Autofill Failure
- Autofill Failure – No Helium
- High Pressure Drive
- Low Vacuum

AUTO Operation Mode:
- Poor Signals Persist

Semi Auto or Manual Mode:
- ECG Detected*
- No Pressure Trigger
- Trigger Interference
- Check Pacer Timing
- Autofill Required

Other:
- Safety Disk Test Fails

* Pumping NOT suspended

B. Medium Priority Alarms:

All Modes:
- IAB Optical Sensor Failure
- Low Battery
- Low Battery

AUTO Operation Mode:
- Poor Signal Quality
- No Pressure Source Available
C. **Low Priority Alarm:**

**AUTO Operation Mode:**
Unable to Update Timing

D. **Technical Alarms:**

- Electrical Test Fails Code #_____
- System Failure
- No Patient Status Available

E. **Informational Messages:**

**All Modes:**
- A.P. Optical Sensing Module Failure
- Unable to Calibrate IAB Optical Sensor
- IAB Optical Sensor Calibration Expired
- No Trigger
- Prolonged Time In Standby
- Autofilling
- Auto Zeroing
- Autofilling and Zeroing
- Function Not Available
- Low Helium
- Battery in Use (EXT)
- Battery In Use
- System Test OK
- System Trainer
- Maintenance Required Code #_____
- Slow Gas Loss Alarm is OFF
- Leak In IAB Circuit – Overridden
- Blood Detected – Overridden

**AUTO Operation Mode:**
Function Unavailable in Auto Operation Mode

**AUTO or SemiAuto Operation Mode:**
- Auto R-Wave Deflate
- R-Wave Deflate

**SemiAuto:**
Irregular Pressure Trigger
SemiAuto or Manual:
Verify Proper Timing
IAB Not Filled
Manual Fill IAB
Auto Operation Mode is Disabled
Gas Loss and Catheter Alarms Disabled

Manual Mode:
Manual Timing Selected – See Help

Other:
Install Safety Disk
Unplug Disk Outlet
Plug Disk Outlet
Leak Testing Safety Disk

F. Patient Conditions
1. Atrial Fibrillation
2. Ectopics
3. Cardiac Arrest
4. Cardioversion/Defibrillation

G. Changing Helium Tank

H. Safety Disk Leak Test

I. Manual Fill

J. Manual Timing
IV. Normal Balloon Pressure Waveform

- Peak Inflation (Positive Overshoot)
- Plateau (Full Inflation Of IAB)
- IAB Inflation
- IAB Deflation
- Zero Baseline
- Return To Zero Baseline
- Peak Deflation (Negative Overshoot)
A. Variations in Balloon Pressure Waveforms

Variations in balloon pressure waveforms may be due to the following conditions:

1. Heart Rate
   Bradycardia
   Increased duration of plateau due to longer diastolic phase
   ![Bradycardia Waveform](image)
   Tachycardia
   Decreased duration of plateau due to shortened diastolic phase.
   ![Tachycardia Waveform](image)

2. Rhythm
   Varying R-R intervals result in irregular plateau durations.
   ![Rhythm Waveform](image)

3. Blood Pressure
   Hypertension
   Increased height or amplitude of the waveform.
   ![Hypertension Waveform](image)
   Hypotension
   Decreased height or amplitude of the waveform.
4. **Gas Loss**

Leak in the closed system causing the balloon pressure waveform to fall *below zero* baseline. This may be due to a loose connection, a leak in the IAB catheter, H$_2$O condensation in the external tubing, or a patient who is tachycardiac and febrile which causes increased gas diffusion through the IAB membrane.

5. **Catheter Kink**

Rounded balloon pressure waveform, loss of plateau resulting from a kink or obstruction of shuttle gas. This may be caused by a kink in the catheter tubing, improper IAB catheter position, sheath not being pulled back to allow inflation of the IAB, the IAB is too large for the aorta, the IAB is not fully unwrapped, or H$_2$O condensation in the external tubing.

6. **Sustained Inflation**

Theoretical possibility if the IAB remains inflated longer than 2 seconds. The Datascope intra-aortic balloon pump will activate the System Failure alarm and deflate the IAB.
## Datascope IABP Performance Checklist – CS300

Name: ________________________________________ Date ____________________

**Hospital policy and procedures review:** Date ________ Initials ________

**Basic Intra-aortic balloon pump course:** Date ________ Initials ________

**Technical Seminar / Advanced Troubleshooting:** Date(s) _______ / _______ Initials _______

**Challenge Exam (if applicable):** Date ________ Score: __________ (P/F)

### Directions for Instructor:
Place your initials next to the skills the participant is able to perform. Leave blank the skills requiring repeat performance. Clarify learning needs if necessary in the comment section. The “Clinical Setting” column is an optional checklist for use by a preceptor or resource person for reinforcement of skills acquired on system trainer.

<table>
<thead>
<tr>
<th>Skills</th>
<th>System Trainer</th>
<th>Clinical Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL SET UP</strong></td>
<td></td>
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</tr>
<tr>
<td>• Establish Power: Main power switch &amp; IABP On/Off switch ⇒ ON</td>
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<tr>
<td>• Open helium tank and verify helium pressure</td>
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<tr>
<td>• Establish ECG and Pressure connections</td>
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<tr>
<td>If using a sensor IAB:</td>
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<tr>
<td>• Ensure the IAB Sensor Cable is connected to the sensor module and clipped to helium extender tubing</td>
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<tr>
<td>If using conventional IAB/Transducer:</td>
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<tr>
<td>• Open transducer to air</td>
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<tr>
<td>• Press zero pressure key for 2 seconds</td>
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<tr>
<td>• Close transducer</td>
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<tr>
<td><strong>CONFIRM OPERATION MODE – AUTO</strong></td>
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<tr>
<td><strong>INITIATE PUMPING</strong></td>
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<tr>
<td>• Attach IAB catheter &amp; appropriate extender to safety disk</td>
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<tr>
<td>• Press the Start key</td>
<td></td>
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<tr>
<td>If using a sensor IAB:</td>
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<td></td>
</tr>
<tr>
<td>• Observe for the “Autofilling &amp; Zeroing” message</td>
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<td></td>
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<tr>
<td>If using conventional IAB/Transducer:</td>
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<td></td>
</tr>
<tr>
<td>• Observe for the “Autofilling” message</td>
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<tr>
<td>• Verify optimal diastolic augmentation</td>
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<tr>
<td><strong>VERIFY AUG. ALARM</strong></td>
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<tr>
<td>• Verify Aug. Alarm setting is approximately 10mmHg less than the patient’s augmented diastolic pressure</td>
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<tr>
<td>• Adjust, if necessary by pressing Aug. Alarm key and using the up and down arrow keys, in the navigation circle, to change value displayed on the screen</td>
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</tr>
<tr>
<td><strong>ASSESS HEMODYNAMIC BENEFITS</strong></td>
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<tr>
<td>• Ensure optimal augmentation</td>
<td></td>
<td></td>
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<tr>
<td>• Ensure optimal afterload reduction</td>
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<tr>
<td>• If desired, IAB deflation can be fine tuned using the IAB deflation control.</td>
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<tr>
<td><strong>RECORD PRESSURES: ASSISTED &amp; UNASSISTED</strong></td>
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<tr>
<td>• Press Print Strip key to record waveforms</td>
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<tr>
<td>• Use Printer Menu in User Preferences to change printer settings</td>
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</tbody>
</table>
## DATASCOPE IABP PERFORMANCE CHECKLIST – CS300

<table>
<thead>
<tr>
<th>Skills</th>
<th>System Trainer</th>
<th>Clinical Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AUTO OPERATION MODE</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Describe ECG and pressure source selection</td>
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<tr>
<td>• Describe Trigger source selection</td>
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<tr>
<td>• Describe automatic timing and Cardiosync 2 with R-Trac</td>
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<tr>
<td><strong>SEMI-AUTO OPERATION MODE</strong></td>
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<tr>
<td>• Describe ECG and pressure source selection</td>
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<tr>
<td>• Describe Trigger source selection</td>
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<tr>
<td>• Describe automatic timing and Cardiosync 2 with R-Trac</td>
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<tr>
<td><strong>PRESSURE SOURCE</strong> - Describes understanding of how pressure source is originated and calibrated</td>
<td></td>
<td></td>
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<tr>
<td>• Fiberoptics</td>
<td></td>
<td></td>
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<tr>
<td>• Conventional IAB/Transducer</td>
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<tr>
<td><strong>TROUBLESHOOTING</strong></td>
<td>System Trainer</td>
<td>Clinical Setting</td>
</tr>
<tr>
<td><strong>DEMONSTRATES ABILITY TO IDENTIFY VARIABLE TRIGGER SELECTION CRITERIA AND APPROPRIATE USE OF EACH TRIGGER</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Atrial Fibrillation</td>
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<td></td>
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<tr>
<td>• Demand Ventricular Pacemaker, Rate 60</td>
<td></td>
<td></td>
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<tr>
<td>• AV sequential pacemaker, demand mode</td>
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<tr>
<td>• Unobtainable ECG signal, regular rhythm, BP 100/50</td>
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<tr>
<td>• Cardiac arrest with good chest compressions</td>
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<tr>
<td>• Sinus Tachycardia</td>
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<tr>
<td>• Sinus Rhythm with frequent PVC’S</td>
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<tr>
<td>• Fixed rate AV sequential pacemaker</td>
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<td></td>
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<tr>
<td>• Atrial pacemaker - 100% paced</td>
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<tr>
<td><strong>EVALUATES SITUATIONS THAT MAY CAUSE AN IAB CATHETER ALARM AND DESCRIBES APPROPRIATE INTERVENTION</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Kink in the catheter or tubing</td>
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<tr>
<td>• Patient sitting straight up in bed</td>
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<tr>
<td>• IAB has not exited the sheath</td>
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<tr>
<td><strong>IDENTIFIES AND RECOMMENDS APPROPRIATE ACTION FOR POTENTIAL LOSS OF HELIUM (“GAS LOSS”)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Blood in the IAB catheter shuttle gas tubing</td>
<td></td>
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<tr>
<td>• IAB catheter disconnected from the console</td>
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<tr>
<td><strong>DISCUSSES THE FOLLOWING ALARM AND INFORMATIONAL MESSAGES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Poor Signal Quality</td>
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<tr>
<td>• Poor Signals Persist</td>
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<tr>
<td>• No Pressure Source Available</td>
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<tr>
<td>• Unable to Update Timing</td>
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<tr>
<td>• IAB Optical Sensor Failure</td>
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<tr>
<td>• AP Optical Sensing Module Failure</td>
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<tr>
<td>• Unable to Calibrate IAB Optical Sensor</td>
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<tr>
<td>• IAB Optical Sensor Calibration Expired</td>
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</table>
### DATASCOPE IABP PERFORMANCE CHECKLIST – CS300

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>System Trainer</th>
<th>Clinical Setting</th>
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<tbody>
<tr>
<td><strong>DISCUSSIONS THE HEMODYNAMIC RELATIONSHIP BETWEEN THE PATIENT AND IABP THERAPY IN REGARDS TO DIASTOLIC AUGMENTATION</strong></td>
<td></td>
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<tr>
<td>• Increased heart rate</td>
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<td>• Decrease in patient stroke volume</td>
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<td>• Ectopy</td>
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<tr>
<td>• Increase in patient BP</td>
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<tr>
<td>• Decreased SVR</td>
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<tr>
<td><strong>DEMONSTRATES APPROPRIATE INTERVENTION FOR THE FOLLOWING ERRORS IN TIMING AND VERBALIZES POTENTIAL CLINICAL IMPLICATIONS</strong></td>
<td></td>
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<tr>
<td>• Early inflation</td>
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<tr>
<td>• Late inflation</td>
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<tr>
<td>• Early deflation</td>
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<tr>
<td>• Late deflation</td>
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<tr>
<td><strong>PORTABLE OPERATION</strong></td>
<td></td>
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<tr>
<td>• Initiates and terminates portable operation</td>
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<tr>
<td>• Identifies location of battery charge light</td>
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<tr>
<td><strong>SLAVE CABLES (IF APPLICABLE):</strong></td>
<td></td>
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<tr>
<td>• Identifies location and use of ECG and/or pressure slave cables</td>
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<tr>
<td>• Describes proper use of ECG slave cable in the presence of pacemakers</td>
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<tr>
<td><strong>LOW LEVEL OUTPUT CABLE (IF APPLICABLE):</strong></td>
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<tr>
<td>• Identifies location and use of low level output cable</td>
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</table>
TROUBLESHOOTING

For the following sections indicate 1 for SATISFACTORY OR 2 FOR REPEAT PERFORMANCE NECESSARY:

SCORE:

____  A. OPERATING MODE
   AUTO OPERATION MODE
   1. Describe ECG and Pressure Source selection
   2. Describe Trigger Source selection
   3. Describe Auto Timing and Cardiosync 2 with R-Trac
   SEMI-AUTO OPERATION MODE
   1. Describe ECG and Pressure Source selection
   2. Describe Trigger Source selection
   3. Describe Auto Timing and Cardiosync 2 with R-Trac

____  B. PRESSURE SOURCE – DESCRIBES UNDERSTANDING OF HOW PRESSURE SOURCE IS ORIGINATED AND CALIBRATED
   1. Fiberoptics
   2. Conventional IAB/Transducer

____  C. TRIGGER - DEMONSTRATES ABILITY TO IDENTIFY VARIABLE TRIGGER SELECTION CRITERIA AND APPROPRIATE USE OF EACH TRIGGER
   WHICH TRIGGER IS THE MOST APPROPRIATE FOR:
   1. Atrial Fibrillation
   2. Demand Ventricular Pacemaker, Rate 60
   3. AV sequential pacemaker, demand mode
   4. Unobtainable ECG signal, regular rhythm, BP 100/50
   5. Cardiac arrest with good chest compressions
   6. Sinus Tachycardia
   7. Sinus Rhythm with frequent PVCs
   8. Fixed rate AV sequential pacemaker
   9. Atrial pacemaker - 100% paced

____  D. IAB CATHETER - DEMONSTRATES UNDERSTANDING OF SITUATIONS THAT MAY CAUSE AN IAB CATHETER ALARM AND DESCRIBES APPROPRIATE INTERVENTION
   DESCRIBE WHY THE FOLLOWING SITUATIONS MAY CAUSE AN IAB CATHETER ALARM
   1. Kink in catheter or tubing
   2. Pt. sitting straight up in bed
   3. IAB has not exited the sheath

____  E. GAS LOSS - IDENTIFIES AND RECOMMENDS APPROPRIATE ACTION FOR POTENTIAL LOSS OF HELIUM
   1. What does blood in the IAB catheter shuttle gas tubing indicate?
   2. Describe the nursing considerations that would be involved
   3. What status message would appear if the IAB catheter became disconnected from the console?
F. DEMONSTRATES UNDERSTANDING OF THE HEMODYNAMIC RELATIONSHIP BETWEEN THE PATIENT AND IABP THERAPY
DESCRIBE WHY THE FOLLOWING FACTORS WOULD CAUSE THE DIASTOLIC AUGMENTATION ALARM TO SOUND:
  1. Increased heart rate
  2. Decrease in patient stroke volume
  3. Ectopy
  4. Decrease in patient BP
  5. Decreased SVR

G. TIMING - RECOGNIZES, INDICATES POTENTIAL CLINICAL IMPLICATIONS, AND DEMONSTRATES APPROPRIATE INTERVENTION FOR THE FOLLOWING:
  1. Early inflation
  2. Late inflation
  3. Early deflation
  4. Late deflation

H. MISCELLANEOUS
PORTABLE OPERATION:
  1. Initiates and terminates portable operation
  2. Identifies location of battery charge light
SLAVE CABLES: (IF APPLICABLE)
  1. Identifies location and use of ECG and/or pressure cables
  2. Describes proper use of ECG slave cable in the presence of pacemakers
  3. Low Level Output (if applicable)
     a. Identifies location and use of low level output cable

INSTRUCTOR SIGNATURE: __________________________________________

COMMENTS: _____________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________
Module III

Clinical Considerations
I. Side Effects/Complications

II. Weaning and Removal
   A. Frequency
   B. Balloon Augmentation

III. Nursing Care Kardex/System Review Care Plan

IV. Critical Pathway/Clinical Progression

V. Considerations for Transport
## I. Side Effects and Complications of IABP Therapy

<table>
<thead>
<tr>
<th></th>
<th><strong>Assessment</strong></th>
<th><strong>Prevention</strong></th>
<th><strong>Treatment Options</strong></th>
</tr>
</thead>
</table>
| **1. Limb Ischemia**   | • Check distal pulses, color, temp. and capillary filling Q30 min x 2 hrs, then Q2 hrs.  
                         | • Monitor differential toe temperatures.                                        | • Use smallest sheath/catheter sizes indicated.                                     
                         |                                                                                  | • Risk factors: female, diabetics, peripheral vascular diseases.                   
                         |                                                                                  | • Select limb with best pulse.                                                    | • Remove sheath and observe for bleeding.                                           
|                        |                                                                                  |                                                                                  | • Subcutaneous Xylocaine injection for arterial spasm.                              
                         |                                                                                  |                                                                                  | • Change insertion site to opposite limb.                                           
|                        |                                                                                  |                                                                                  | • Bypass graft femoral artery.                                                     |
| **2. Excessive bleeding from insertion site** | • Observation - anteriorly and posteriorly for blood or hematoma.        | • Careful insertion technique.                                                    | • Apply pressure. Assure distal flow.                                               
|                        |                                                                                  | • Monitor anticoagulation therapy.                                                | • Surgical repair.                                                                 |
|                        |                                                                                  | • Prevent catheter movement at insertion site.                                   |                                                                                     |
| **3. Thrombocytopenia** | • Daily platelet count.                                                          | • Avoid excessive heparin.                                                        | • Replace platelets as needed.                                                     |
| **4. Immobility of balloon catheter.** | • **DATASCOPE RECOMMENDS THAT THE IAB NOT BE LEFT IMMUNE IN THE PATIENT FOR MORE THAN 30°.**  
                         | • Observation of IAB status indicator movement.                               | • Maintain adequate trigger.                                                      | • Notify the physician if the IAB is immobile for > 30°.                            
<p>|                        | • Observation of augmentation.                                                  | • Observe movement of IAB Status indicator.                                      |                                                                                        |
|                        |                                                                                  | • If unable to inflate the IAB with the IABP, inflate and deflate the IAB by hand, using a syringe and stopcock once every 3-5 min. |                                                                                        |</p>
<table>
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<tr>
<th></th>
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<tbody>
<tr>
<td>5. Balloon leak</td>
<td>• Observe tubing for blood with or without the presence of a blood detect, low augmentation, and/or gas loss or IAB catheter alarm.</td>
<td>• Do not remove the IAB from its tray until it is ready to be inserted.</td>
<td>• If blood is observed in the pneumatic tubing, disconnect the balloon from the IABP and notify the physician immediately.</td>
</tr>
<tr>
<td>6. Infection</td>
<td>• Observation of insertion site. • Blood cultures for symptoms of infection.</td>
<td>• Sterile technique during insertion and dressing changes as per infection control policy.</td>
<td>• Antibiotics.</td>
</tr>
<tr>
<td>7. Aortic Dissection</td>
<td>• Assess for pain between shoulder blades. • Daily hematocrit. • If suspected, aortogram may be indicated.</td>
<td>• Insertion of IAB over guide wire with fluoroscopic control.</td>
<td>• Balloon removal. • Surgical repair.</td>
</tr>
<tr>
<td>8. Compartment syndrome may develop after IAB removed.</td>
<td>• Observation of limb for swelling and/or hardness. • Measure calf girth. • Monitor interstitial pressure.</td>
<td>• Use the smallest catheter/sheath appropriate. • Maintain adequate colloid osmotic pressure.</td>
<td>• Fasciotomy if necessary.</td>
</tr>
</tbody>
</table>
Plan of Care for IABP Patient

Vital Signs:
Monitor Q15'-Q30' until stable
Including hemodynamic parameters
Heart Rate
Mean Arterial Pressure
CVP
Pulmonary Artery Pressure
Pulmonary Capillary Wedge Pressure
Note and record: Cardiac Output/Cardiac Index
System Vascular Resistance

Notify physician if:
Accepted hemodynamic parameters deviate
Significant change ABG studies or chest film
Low urine output < 30cc/hr
Signs of limb ischemia
IABP non-functioning > 15°

Special Treatment Needs:
Note and record quality of pedal pulses Q30° after insertion x 2H, then Q2H
Change IABP dressing - PRN with sterile technique
Utilize air mattress/heel protectors PRN
Maintain anti-coagulant protocol
Observe for side effects/complications of IABP
Routine care associated with:
   Respiratory and O₂ therapy
   N-G tube
   Hemodynamic monitoring lines
   Chest tube
   IV's
   Foley catheter

IABP:
Refill IAB Q2H/PRN
Maintain optimal augmentation afterload
Reduction by adjusting timing PRN
Zero transducer PRN
Note placement IAB on chest X-ray
Change Helium tank PRN

Intake/Output:
Q1H (Strict)
Urine Specific Gravity - Q8H
Sugar/Acetone PRN

Activity:
Bedrest with log rolling
Do not elevate HOB > 30°-45°
Do not flex balloon leg at groin or knee
Utilize fracture bedpan
ROM Q8H to uninvolved extremity
Dorsiflexion of involved foot

Diet:
NPO - clear liquid - soft as tolerated
Supplemental nutritional support
Tube feedings - hyperalimentation

Respiratory Therapy:
Evaluate breath sounds Q4H & PRN
Routine respiratory care of patient with endo tube/trach
Sterile suction technique
Modified respiratory therapy
Coughing and deep breathing, incentive spirometry and nasotrachial suctioning may be utilized

Daily Lab Work/PRN Blood Work:
SMA - 18 QD
Monitor K⁺, BUN, creatinine closely PRN
Cardiac enzymes CPK, isoenzymes QD
CBC with Diff. QD/PRN
Platelets, PT, PTT, clotting times QD/PRN
ABG - monitor closely QD/PRN
Chest X-ray QD
Urine and serum osmolarity - QD
EKG QD - rhythm strips PRN
Blood, urine and sputum cultures for temperature 102°
# Nursing Care of the Patient on an Intra-Aortic Balloon Pump

## System
### Potential Problems
- Left Ventricular Failure
- Pulmonary Edema
- Pulmonary Emboli
- Atelectasis
- Pneumonia
- Pleural Effusions
- Altered Level of Consciousness
- Psychosis
- Over Sedation
- Cerebral Embolization

## Nursing Interventions

### Cardiac
- Monitor Vital Signs q15-30' until stable
  - Blood Pressure (MAP, Syst, DA, AOEDP)
  - Heart Rate
  - PAP
  - PCWP/LAP
  - Cardiac Output/Cardiac Index
  - CVP
  - SVR (Systemic Vascular Resistance)
- Maintain Optimal Diastolic Augmentation and Afterload Reduction
- Maintain Clarity of ECG Pattern Serving as Trigger
- Rhythm Strips prn
- 12 Lead ECGs QD and prn
- Cardiac Enzymes
- Check Pacer Function

**Caution:** In the event of Asystole, assure balloon movement by placing Trigger on ECG, Arterial Pressure or Internal (bear in mind a Mean Arterial Pressure of about 50 mmHg is required to visualize augmentation).

### Respiratory
- Monitor ABGs closely prn
- Observe Chest X-ray QD
- Lung fields
- Balloon position
- Provide appropriate ventilatory support
- Standard respiratory care on intubated patient with sterile suctioning technique
- Post-extubation, modified respiratory therapy is utilized
- Deep breathing, coughing, chest physiotherapy and naso-tracheal suctioning may be used
- Elevate HOB 30'
- Turning (if hemodynamically stable) cautiously

### Neurological
- Neurological assessment q2h/prn
- (Pupils, LOC, motor function)

### Psychiatric
- Appropriate sedation
- Normalization of environment (TV and radio, if appropriate)
- Uninterrupted rest periods are essential to these patients
- Emotional support regarding fears and anxieties should be provided to patient and family
# Nursing Care of the Patient on an Intra-Aortic Balloon Pump

<table>
<thead>
<tr>
<th>System</th>
<th>Potential Problems</th>
<th>Nursing Interventions</th>
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</thead>
<tbody>
<tr>
<td>Renal</td>
<td>Prerenal Failure</td>
<td>Observe urine output q1h&lt;br&gt;Notify physician if &lt; 30cc or &gt; 200 cc/hr. In absence of diuretics or fluid challenge</td>
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<tr>
<td></td>
<td>acute Renal Failure</td>
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<td></td>
<td>Urinary Tract Infection</td>
<td>Strict Intake and Output&lt;br&gt;Observe patient's fluid volume status - Intake and output&lt;br&gt;Daily Serum K+, BUN, Creatinine or Blood chemistries qd/prn&lt;br&gt;Daily weight&lt;br&gt;Urine Specific Gravity q8h&lt;br&gt;Urine Electrolytes and Osmolarity qd&lt;br&gt;Note appearance of urine&lt;br&gt;Watch for signs of urinary tract infection&lt;br&gt;Check position of IAB catheter on chest film</td>
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<tr>
<td></td>
<td>Occlusion of Renal Artery</td>
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<tr>
<td>Vascular</td>
<td>Peripheral Ischemia</td>
<td>Check peripheral pulse (q15” x 1 hr, then q2h post-insertion&lt;br&gt;Pedal, Posterior Tibial, Popliteal</td>
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<td>Thrombocytopenia</td>
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<td></td>
<td>Peripheral Embolism</td>
<td>Observe color and temperature of involved leg q2h&lt;br&gt;Maintain anticoagulation protocol:&lt;br&gt;Heparin&lt;br&gt;Aspirin&lt;br&gt;Rheomacrodex&lt;br&gt;Observe coagulation studies: PT, PTT, Platelets, Hbg and Hct&lt;br&gt;Observe for side effects of anticoagulation therapy: petechiae, ecchymosis, excessive bleeding from catheter insertion sites&lt;br&gt;Avoid flexing the patient’s hip and knee of involved leg due to IAB catheter&lt;br&gt;Apply anti-embolism stockings to non-involved leg</td>
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<tr>
<td></td>
<td>Bleeding from Anticoagulation</td>
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<tr>
<td>Immunologic</td>
<td>Wound Infection</td>
<td>Monitor temperature&lt;br&gt;Observe WBC&lt;br&gt;Maintain antibiotics&lt;br&gt;Change IAB dressing qd - strict sterile technique&lt;br&gt;Maintain “Best Practice” for all hemodynamic lines and observe for drainage&lt;br&gt;Culture appropriate sites including blood, urine and sputum if specific signs and symptoms of infection process are present.</td>
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## Nursing Care of the Patient on an Intra-Aortic Balloon Pump

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<tr>
<th>System</th>
<th>Potential Problems</th>
<th>Nursing Interventions</th>
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<tbody>
<tr>
<td>Gastro-intestinal</td>
<td>Nutritional</td>
<td>May have diet as tolerated (clear liquid/soft)</td>
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<td>Stress Ulceration</td>
<td>Hyperalimentation or tube feedings may be necessary with prolonged intubation</td>
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<td></td>
<td>Paralytic Ileus</td>
<td>Measure abdominal girth q8h</td>
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<td>Assess bowel sounds q8h</td>
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<td>Observe for abdominal distention. Use stool softeners and fracture bedpan as appropriate</td>
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<td>Portable KUB X-ray may be required without interrupting IABP</td>
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<td>Naso-Gastric tube if appropriate</td>
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<td>Naso-Gastric drainage q8h for occult blood</td>
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<td>Provide appropriate antacid regimen</td>
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<tr>
<td>Musculoskeletal</td>
<td>Thrombosis</td>
<td>ROM - Active and Passive to uninvolved leg</td>
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<td>Decubitus Ulcer</td>
<td>Dorsiflexion of foot on involved leg</td>
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<td>Foot Drop</td>
<td>Turn (log roll) q1-2h – cautiously if hemodynamically stable</td>
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<td>Apply air mattress and utilize heel and elbow protectors</td>
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<td>Use footboard or high top tennis shoes to prevent foot drop</td>
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<tr>
<td>Patient and Family</td>
<td>Family anxiety</td>
<td>Reinforce simple explanation to patient and family</td>
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<tr>
<td>Teaching</td>
<td>Late Distal Emboli</td>
<td>Discharge planning – communication of progress to nursing floor</td>
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<td></td>
<td>Late Aortic Dissection</td>
<td>Observe for and instruct in manifestations of late peripheral ischemia or emboli</td>
</tr>
<tr>
<td>Cardiac Assist Device</td>
<td>Mechanical Function of IABP</td>
<td>Note and record settings according to hospital policy</td>
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<td>Obtain optimal diastolic augmentation and optimal afterload</td>
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<td>Reduction prn</td>
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<td>Notify physician of difficulty</td>
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<td>Prevent inflation of IABP during Ventricular Ejection</td>
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<td>Maintain adequate ECG and arterial trace</td>
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<td>Change Helium tank prn</td>
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<td>Note IAB autofill q2h/refill prn</td>
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<td>Watch for signs of balloon leak: frequent loss of augmentation, blood in extender tubing</td>
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<td>If IAB catheter is immobile for greater than 30 minutes, notify physician for appropriate intervention</td>
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</table>
## Critical Pathway of the Intra-aortic Balloon Pump Patient

<table>
<thead>
<tr>
<th></th>
<th>Insertion</th>
<th>Pumping</th>
<th>Weaning</th>
<th>Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood Work</strong></td>
<td>H&amp;H, pt, ptt</td>
<td>Platelet count, WBC</td>
<td>Prior to removal, obtain: H&amp;H, pt, ptt, platelet count</td>
<td></td>
</tr>
<tr>
<td><strong>Diagnostic Procedures</strong></td>
<td>Fluoroscopy</td>
<td>Routine CXR qd, radiopaque tip at 2nd to 3rd ICS</td>
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<tr>
<td><strong>Treatments</strong></td>
<td>Shave and prep both potential insertion sites</td>
<td>Monitor insertion site frequently. Arterial line care per policy. Dressing change per policy.</td>
<td>Pressure applied and site dressed per policy.</td>
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<tr>
<td><strong>Activity</strong></td>
<td>Maintain bed rest:</td>
<td></td>
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<td>Bed rest per policy. OOB as tolerated.</td>
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<td></td>
<td>Do not raise HOB &gt; 30 degrees.</td>
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<td></td>
<td>Do not flex or bend the leg in which the IAB was inserted.</td>
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<td></td>
<td>Assist the patient with log rolling and positioning.</td>
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<tr>
<td><strong>Nutrition</strong></td>
<td>Will depend on the patient’s condition and the indication for IAB insertion.</td>
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<tr>
<td><strong>Nursing Interventions</strong></td>
<td>Assess patient and monitor hemodynamic alterations per ICU routine.</td>
<td>Administer IV fluids, vasodilator and/or inotropic agents per orders. Assess patient for pain or discomfort and medicate per physician order. Assess vascular status (color, sensation and movement) as well as pulse quality (pedal, posterior tibial, popliteal, femoral, and radial bilaterally).</td>
<td>Maintain anticoagulation protocol per physician order and observe for side effects. Encourage deep breathing. Assist the patient with turning and positioning at least q2h. Observe for urine output ≥ 30cc/hr</td>
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<td>Assure IAB movement, verify IABP controls in accordance with hospital policies.</td>
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<tr>
<td><strong>Patient Teaching</strong></td>
<td>Educate the patient and family members on IABP therapy utilizing the patient education brochure. Explain each phase of the IABP process. Instruct patient to:</td>
<td>- apply pressure to insertion site if they should cough or sneeze - report any chest pain or heaviness - report any pain, numbness or tingling in their arms or legs</td>
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</tbody>
</table>
### Critical Pathway of the Intra-aortic Balloon Pump Patient

<table>
<thead>
<tr>
<th>Expected Outcomes</th>
<th>Insertion</th>
<th>Pumping</th>
<th>Weaning</th>
<th>Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patient and family will have adequate knowledge base of IABP therapy. Relief of patient and family anxiety. The patient will experience clinical improvement from the IAB by: - increasing the supply of myocardial oxygen - decreasing the demand for myocardial oxygen This will be evidenced by: - increased cardiac output - increased MAP - decreased PAP/PCWP - decreased chest pain Smooth progression through IABP therapy. Patient hemodynamically stable.</td>
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</tbody>
</table>

The foregoing is intended to serve as a guideline for the development of a critical pathway. It is not a recommendation from Datascope Corp.
# Clinical Progression - Intra-aortic Balloon Pump Therapy

<table>
<thead>
<tr>
<th>Description of Phases</th>
<th>Insertion</th>
<th>Pumping</th>
<th>Weaning</th>
<th>Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A balloon is positioned in your aorta after being introduced through an artery.</td>
<td>The IABP shuttles gas from the console to the balloon and is timed with your heart beat.</td>
<td>Decreasing the amount of assistance your heart needs from the IABP</td>
<td>Removing the balloon from your artery.</td>
</tr>
<tr>
<td>Teaching</td>
<td>Most insertions of the IAB can be completed in approx. 15 minutes. The insertion site will be numbed prior to insertion. During the insertion, you may feel some pressure at the insertion site.</td>
<td>The IABP is helping your heart but not beating for it. Pumping will stop every 2 hours for a short period of time. This is normal.</td>
<td>The amount of time it takes to wean varies for each patient.</td>
<td>Removal is typically done at the bedside and only takes a few minutes to complete.</td>
</tr>
<tr>
<td>Activity</td>
<td>Bed Rest</td>
<td></td>
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<tr>
<td></td>
<td>- To ensure that the IAB remains in the proper position, you should not sit up or attempt to get out of bed.</td>
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<tr>
<td></td>
<td>- The leg in which the IAB is inserted should not be bent or flexed.</td>
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<tr>
<td></td>
<td>Your nurse will assist you with turning and changing your position. Take deep breaths frequently.</td>
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<tr>
<td>Nursing Interventions</td>
<td>Your condition will be monitored according to ICU routine. The nurse will assess your vital signs, which include: - Heart rate and rhythm, blood pressure, respirations, pulse checks and other measurements as your condition warrants. The insertion site will be checked frequently by your nurse. The dressing will be changed on a regular basis. Your nurse will give you pain medication. Please report any of the following: - chest pain or heaviness, pain, numbness or tingling in your arms or legs.</td>
<td></td>
<td>Report any wetness at the insertion site.</td>
<td></td>
</tr>
<tr>
<td>Diagnostic Procedures</td>
<td>Fluoroscopy (X-ray guidance) may be utilized during insertion. Chest X-ray will be done to verify placement of the IAB.</td>
<td></td>
<td>Routine chest X-rays will be obtained during IABP therapy.</td>
<td></td>
</tr>
</tbody>
</table>
# Clinical Progression - Intra-aortic Balloon Pump Therapy

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Nutrition</strong></td>
<td>Your diet will depend on your condition and the reason the IAB was inserted.</td>
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<tr>
<td><strong>Lab Tests</strong></td>
<td>Blood tests will be obtained prior to the insertion.</td>
<td>Blood tests will be obtained as your condition warrants it.</td>
<td></td>
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</tr>
</tbody>
</table>

The foregoing is intended to serve as a guideline for developing a clinical progression for IABP Therapy. It is not a recommendation from Datascope Corp.

Patient Questions
Comments

Patient Name
Date of IAB insertion
This clinical progression is an outline of what to expect for patients and families who require Intra-aortic Balloon Pump Therapy. The process will vary for each patient.
V. Considerations for Transport

A. Purpose of Transport Program

B. Planning the Transport Program
   1. Retrieval vs. Referral
   2. Coordinator of Transport Team

C. Transport Team
   1. Physician
   2. Nurse, IABP Technician

D. Transport Program Considerations
   1. Team Leader
   2. Liabilities
   3. Communication and Response Procedure
   4. Consent Form and Patient Chart
   5. Family Education
   6. Patient Management During Transport

E. Vehicle Used for Transport
   1. Ambulance
      a. power supply
      b. equipment on board
      c. ramp
      d. response time
   2. Aircraft
      a. power supply
      b. equipment on board

F. Equipment Considerations
   1. IABP Supplies
   2. Drugs
   3. Infusion Pumps
   4. Respiratory Care

G. Post Transport Considerations
   1. Equipment Check
   2. Follow-up
REFERENCE LIST


Benchmark Counterpulsation Outcomes Registry 2005.


Ohman EM. Counterpulsation and thrombolysis together improve survival after cardiogenic shock – the TACTICS results. Presented at the 22nd Congress of European Society of Cardiology on August 27, 2000 in Amsterdam, the Netherlands.


BIBLIOGRAPHY

THEORY


INDICATIONS


George BS. Thrombolysis and intra-aortic balloon pumping following acute myocardial infarction - Experience in four TAMI studies. Cardiac Assists 1988 October;4(3).


**COMPLICATIONS**


**INSERTION**


**PEDIATRICS**


TRANSPORT


NURSING CARE


Shoulders O. Managing the challenge of IABP therapy. Critical Care Nurse 1991 Feb;11(2):60-76.

PROGRAM AND SPEAKER EVALUATION

Managing IABP Therapy
Program Code 05

Date: ______________________

Please rate the program and speaker items by placing a mark in the appropriate column.

<table>
<thead>
<tr>
<th>Program Evaluation</th>
<th>1 Poor</th>
<th>2 Fair</th>
<th>3 Good</th>
<th>4 Very Good</th>
<th>5 Excellent</th>
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<tbody>
<tr>
<td>1. Program met the stated objectives</td>
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<td>2. Content covered topic adequately</td>
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<td>3. Overall quality of this program</td>
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<td>4. Overall quality of speaker(s)</td>
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<td>5. Quality of the program facilities</td>
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<td>6. Program met my personal objectives</td>
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<td>7. I can incorporate program content into my practice</td>
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</table>

Speaker Name: ______________________________________________________

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<tbody>
<tr>
<td>1. Objectives – Stated learning objectives met</td>
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<td>2. Audiovisual – Contributed to presentation</td>
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<tr>
<td>3. Content – Relevance of content to objectives</td>
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<td>4. Presentation – Speaker qualified and held interest</td>
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<td>5. Effectiveness – Speaker was organized and effective</td>
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<tr>
<td>6. Practice – Validated and/or changed practice</td>
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</table>

Comments:

Participant Name: _____________________________________________________